in these seeds is entirely due to the coats. The delicacy of the coat is no criterion of its effect, for certainly few seed coats are more delicate than that of the upper seed of the cocklebur, yet it generally secures a delay of a year or more.

It is surprising that experimenters are so slow to see that the proper test for dormancy of an embryo is to free it from incasing membranes with aseptic precautions and then to subject it to germinative conditions. This treatment will probably show the cause of most cases of delay to be in structures surrounding the embryo. If such treatment shows real dormancy of the embryo, as in the radicle of the hawthorn,[14] it is then necessary to find the particular process that is delinquent. This is certainly possible in the light of the great progress that is being made in studying the catalytic nature of protoplasmic activity. When cases of delayed germination are investigated in this way, we may hope for progress. But to assume dormancy is merely marking time and leaves the physiology of delayed germination, as it is now, more than ten years behind other phases of plant physiology.—WM. CROCKER.

Permeability.—RUHLAND[15] holds entirely untenable OVERTON'S theory of the permeability of protoplasm, both in its original form and as modified by NATHANSOHN. In the main RUHLAND offers the same sort of evidence as has ROBERTSON[16] from the animal side. RUHLAND studied the ability of various organic dyes to enter the living cell. Malachite green and thionin, both almost insoluble in lipoids, enter the live cells readily, while rhodamin, highly soluble in lipoids, hardly penetrates them at all. He cites a number of other dye stuffs where just the opposite behavior occurs to that expected by the lipoid theory. Both the acid and basic phthaleins are highly soluble in lipoids. The former penetrate living cells readily while the latter scarcely enter at all. RUHLAND says we have no hint of a reason for this behavior. RUHLAND and ROBERTSON agree that a thin layer of lipoids often exists near the periphery of the protoplasm. They believe, however, that it is not continuous in any case, but only fills interstices of the protein matter. ROBERTSON attributes the permeable character to the nature of the outer, very sparingly soluble, protein layer.—WM. CROCKER.

Reproduction and stimuli.—FREUND[17] has done a rather elaborate piece of work on the effect of external conditions upon the asexual reproduction of Oedogonium and Haematococcus. He finds that previous culture conditions determine very largely the effect of any reagent. Of the several methods he found of producing this response two illustrations will suffice to give an idea of the work. After

[14] CROCKER, WM., Longevity of seeds. BOT. GAZETTE **47**:69–72. 1909.

[15] RUHLAND, W., Beiträge zur Kenntnis der Permeabilität der Plasmahaut. Jahrb. Wiss. Bot. **46**:1–54. 1908.

[16] ROBERTSON, T. B., On the nature of the superficial layer in cells and its relation to their permeability and to the staining of tissues by dyes. Journ. Biol. Chem. **4**: 1–34. 1908.

[17] FREUND, HANS., Neue Versuche über die Wirkung der Aussenwelt auf die ungeschlechtliche Fortpflanzung der Algen. Flora **99**:41–100. 1908.

Oedogonium has grown for a considerable time in distilled water in the light, a transfer to darkness or to a dilute nutrient solution causes a development of zoospores. Resting cells of Haematococcus, kept in darkness for some time, produce swarmspores upon being illuminated or supplied with cane or grape sugar.

FREUND finds the chemical nature of the medium rather than its physical or osmotic character the important consideration in the asexual reproduction. In contrast to this, LIVINGSTON found the osmotic character of the media the main consideration in determing the form of Stigeoclonium.—WM. CROCKER.

Phototropic response.—BLAAUW,[18] working with the seedling of *Avena sativa*, concludes that the intensity of the light, multiplied by the least time of exposure necessary to give a phototropic response, is approximately a constant. The intensities used varied from 0.000439 to 26,520 Hefner candles, and the time of exposure from 13 hr. to 0.001 sec. The product of the exposure in seconds by the intensity in Hefner candles averages about 21 and varies from 16.9 to 26.5. This, of course, hardly looks like a constant; but the variation is attributed to the individual differences of the seedlings. The intensity of the light was measured with a Weber photometer, and the observation of the response was made two hours after the end of the exposure. The author says, "The essential condition for the production of a phototropic curvature is the supply of a definite quantity of radiant energy; whether this quantity be supplied in a very short time or extremely slowly, is a matter of indifference."—WM. CROCKER.

Spraying potatoes.—A recent bulletin[19] summarizes the results of the seventh year's work in the ten-year series of potato-spraying experiments begun in New York in 1902. In the ten-year experiments at Geneva, six sprayings increased the yield 39 bushels per acre and three sprayings increased it 29.5 bushels, although both early and late blight were wholly absent and there were but few flea beetles. In fourteen "farmers' business experiments" including 200 acres, the average gain due to spraying was 18.5 bushels per acre; the average total expense of spraying, $4.30 per acre; and the average net profit, $8.53 per acre. In five of the experiments spraying was unprofitable. Eleven "volunteer experimenters" reported gains averaging 66.3 bushels per acre.—F. L. STEVENS.

Alfalfa.—An exceedingly interesting and comprehensive bulletin concerning alfalfa[20] has just appeared from the New York Experiment Station. Among the subjects treated are the following: Varieties grown, uncongenial soil conditions,

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[18] WENT, F. A. F. C., On the investigations of Mr. A. H. BLAAUW on the relation between intensity of light and the length of illumination in the phototropic curvatures in seedlings of *Avena sativa*. Reprint from Proc. Kon. Akad. Wetens. Amsterdam, Sept. 26, 1908. pp. 5.

[19] STEWART, F. C., FRENCH, G. T., and SIRRINE, F. A., N. Y. Agric. Exp. Sta. Bull. 311. January, 1909.

[20] STEWART, F. C., FRENCH, G. T., AND WILSON, J. K., Troubles of alfalfa in New York. N. Y. Agric. Exp. Sta. Bull. 305. November, 1908.